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THE PENCK FESTBAND: A REVIEW*

By W. M. Davis

The Man and the Volume

Let the memories of four painful years be set aside as far as possible while this well-earned tribute to a great geographer is reviewed. The volume opens with an address from one hundred and sixty-three of his former students—the list would have been significantly longer if the events of those obtrusive years had not excluded a number of non-Teutons—an address glowing with gratitude for the instruction and inspiration received by the disciples from their master and with enthusiasm for the subject which he has, in their opinion, done so much to raise to the rank of an independent science. They admire the broad range of his studies, developed chiefly in different phases of physical geography and extended into human and political geography; and they properly take pride in his numerous activities as teacher, organizer, explorer at home and abroad, and prolific writer. The many geographers of all countries who have had to do with Penck at international congresses and on distant journeys will recognize the justice of this tribute; for during the last thirty years his has been one of the most active and attractive minds in every gathering that he has joined. His scientific originality and his genial personality have been equally enticing. He used to be liked as much as admired, but during the war some of his statements have lessened the esteem formerly felt for him: into that matter we do not enter farther here.

The *Festband* contains twenty-two essays by as many writers and thus covers a wide variety of subjects. Morphology of the lands takes the lead with eleven; anthropogeography has three; hydrography and geographical education, two each; and climatology, economic geography, cartography, and method are each allotted one. All the contributions are serious, advanced studies. They give little indication that a fearful war was raging while they were written and published, although the otherwise surprising fact that only one essay deals with exploration in a distant region is perhaps thus to be explained. The effect of the war may, however, be recognized in having given opportunity during the German occupation of Constantinople for a study of the currents of the Bosporus by Merz and in having tempted Krebs, in the introductory phrases of his anthropogeographic study of the Balkans, to make the somewhat premature statement that the opening of that region is among the most valuable results which the war has brought to "us Germans." All the essays deserve separate consideration; the present writer reviews three regional physiographic studies of limited districts in central Europe on the later pages of this article.

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*Festband. Albrecht Penck: Zur Vollendung des sechzigsten Lebensjahrs gewidmet von seinen Schülern und der Verlagsbuchhandlung. xii and 438 pp.; maps, diagrs., ills. (Bibliothek Geogr. Handbücher.) J. Engelhorns Nachf., Stuttgart, 1918.

Domination of the Geological Standpoint

A careful study of these three essays and a general examination of the others suggests the question whether full warrant can be found for the assertion in the dedicatory address to the effect that Penck has raised geography to the rank of an independent science; for, like his own work as exhibited in numerous publications, many of the essays in the *Festband* are by no means freed from domination by geology. Just as the masterly investigation, "Die Alpen im Eiszeitalter," conducted by Penck jointly with Brückner of Vienna, is essentially a geological study, however interesting and valuable its geographical by-products are, so the work of his students as illustrated by several essays in the *Festband* appears to be concerned more with the evolution than with the description of land forms; and the evolution is treated largely from a geological standpoint rather than directed to a geographical end. Furthermore, not a single essay is devoted to full-fledged geography in the sense of giving a complete or regional account of a limited district, beginning with its physiography and climate and ending with its human inhabitants. The anthropogeographical study of the Balkans, above mentioned, gives, as is usual in such essays, no sufficient physiographic basis for its conclusions; and conversely the several morphological essays stop with land forms and do not go on to their human consequences.

It is indeed disappointing that a volume which celebrates the achievements of a leading European geographer should not contain at least one simple, direct, and competent study in regional geography; simple, in the sense of omitting all irrelevant geological and historical matter, however interesting such matter may be in itself; direct, in presenting the essentially geographical results that are reached by preparatory analytical discussions, while omitting the analyses and discussions that lead to the results; and competent, in showing a broad grasp of all phases of geography instead of specialization in one or more of its subdivisions. But, disappointing as the absence of such studies is, the same criticism would probably apply to the work of students trained under other modern teachers: their pupils too seldom become full-fledged geographers in the sense above indicated. Exception should be made, however, in favor of the late Paul Vidal de la Blache; his disciples have produced a good number of admirable regional volumes, although the authors of some of them, following the habit of gheir master, draw more largely upon history than seems desirable in pure teography.

The volume here reviewed is also disappointing in giving so much attention to the science of investigation as not to allow sufficient cultivation of the art of presentation. Even in the mere matter of book making the needs of readers are not enough considered; for most of the essays are not well divided into sections, page headings give only the author's name and the title of his essay, and there is no index. In so far as the morphological essays which occupy half of the volume are concerned, they are not notable for clearness of exposition. All the essays reflect an enthusiasm for research, and that is excellent; but their authors do not seem to have devoted much thought as to how their results could be best set forth or as to how the essentially geographical elements of their results should be given due prominence. This is shown by the greater attention frequently accorded to invisible past processes than to their visible present products, as well as by the scarcity of outline maps and diagrams and by the commonplace quality of such diagrams as are included. The volume is not so great a product, geographically measured, as might have been expected.

The Harz Foreland

Three morphological essays are here selected for review, as being more in line with Penck's own studies than the essays on other subjects. One of them treats the southern foreland of the Harz Mountains, the second discusses the Vienna basin, and the third describes the Podolian upland in Galicia. The first, by Gisela Frey,[1] explains that the upheaved fault block of the Harz in central Germany, composed of deformed and greatly degraded ancient rocks, is bordered on the south by the broad and shallow Thuringian syncline, around which a resistant limestone forms an irregular cuesta. The northern arm of the cuesta trends to the east; the southern to the southeast; thus the two diverge eastward with the gentle pitch of the synclinal axis, and unite westward and are there extended in isolated tables along the gradual ascent of the axis toward the valley of the Weser. The weaker underlying strata between the northern cuesta arm and the Harz block are excavated in an open east-west depression, about 25 kilometers wide; this is the foreland of the Harz described in Frey's essay.

STRUCTURE AND DEVELOPMENT

The foreland is treated under three headings; structure and development, hydrography, and local features. The structure is more complicated to the east and west than on the south of the middle Harz; hence the central district may be taken as the simple type from which the eastern and western extensions depart in various ways. The structural description of the foreland and the adjoining uplands is highly geological in that it discusses the dates at which various complications of structure were produced and at which a peneplain was afterwards developed over the whole district. Half a page is given to prove that the peneplain is Eocene or older, thus emphasizing a purely geological problem, which, however important it may be in a morphogenetic analysis, has no proper place in a physiographic description. A later cycle of erosion, introduced by regional uplift, is now in an advanced stage; thus the hard and soft strata, which had been broadly truncated in the peneplain, again express their resistance or weakness in surface forms. The forms thus sculptured by normal erosion are more or less covered both by gravels and sands spread out by proglacial streams, and also by loess laid over them by the wind.

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[1] Das südliche Harzvorland: Ein Kapitel aus einer Landeskunde, *Festband*, pp. 135-159.

The hydrography is set forth chiefly in its existing condition with little regard to its development. The description of individual streams sometimes expresses an empirical structural relation, as where streams are said to be anticlinal or cataclinal; sometimes a genetic relation, as where they are said to be consequent or subsequent. The difference of treatment appears to be accidental rather than systematic and intentional. A closing paragraph briefly states that the present stream courses have been developed by erosion through a Tertiary cover which formerly overspread the now dissected or destroyed peneplain, and that various captures and adjustments to weak strata have taken place; but the visible landscape features associated with the captures and adjustments are not clearly set forth.

Local Features

Reference may be made to a few of the local features as samples of the rest. South of the central foreland, which is unsystematically dissected in low relief, rises the northern arm of the above-described cuesta, there bearing the names of Dün and Hainleite; it is maintained in somewhat irregular outline by the resistant Muschelkalk with a subordinate overlapping cuesta on its back slope. Here the dip of the cuesta-making strata is moderate and the cuesta upland is broad enough to retain traces of the ancient peneplain. To the east the dip increases, apparently because a small Harz-like mass, known as the Kyffhäuser, is upheaved near by. It may be noted in passing that the northern face of this mass is briefly described as a *Bruchstufe* or fault scarp; but, as the upheaval of the mass antedates the peneplanation of the region, the scarp must be due to erosion, not to faulting; and it therefore deserves a distinguishing name, such as fault-line scarp; its height is not a measure of the original displacement but of the difference of altitude between the uplifted peneplain and the present lowland. As if deflected by this uplift the cuesta turns to the southeast, and by reason of the steepened dip of its determining strata it is transformed into a narrow ridge, the Schmücke, across which the Unstrut, the chief river of the synclinal basis, flows out to the northeast on the way to the Saale and the Elbe.

To the west of the central foreland there is no exterior upheaval like the Kyffhäuser, and the strata outside of the main cuesta lie nearly flat:

hence the foreland here widens as the border of the Harz turns to the northwest. In the broadened space thus opened the Dün is fronted by two scarped uplands, maintained by residual patches of the cuesta-making limestones which are there gently warped down in faint structural basins; the smaller and eastern upland is the Bleicheroder Berg, the larger and western is the Ohmgebirge; farther to the northwest the scarped edge of the Göttingen upland is of similar origin. Just north of the Ohmgebirge the lower land is interrupted by a north-trending ridge, which represents a narrow down-faulted block, now standing in relief because the cuesta-making limestones are there depressed nearly to the level of the worn-down lowland surface. Singularly enough this ridge, known as the Klien, although it represents a structural depression, now forms part of the main divide between the Elbe and the Weser river systems. Farther west the frayed-out end of the Dün is extended at the apex of the main syncline by isolated outliers, influenced by unspecified structural complications.

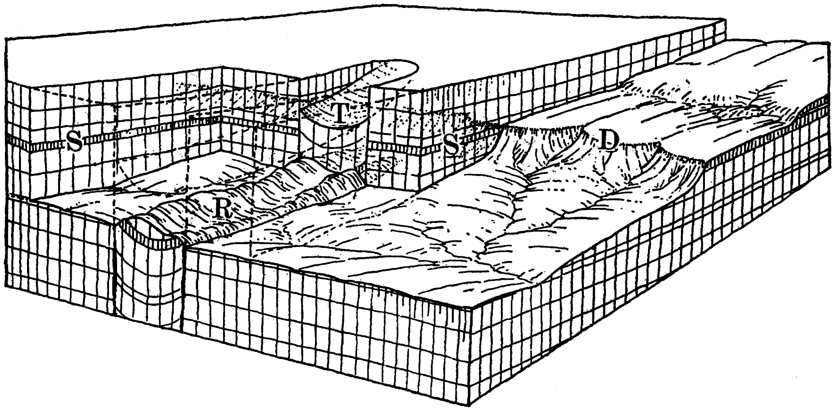

FIG. 1—The Klien, R, north of the Ohmgebirge, D, looking southeast. The Klien is a down-faulted block of synclinal structure, now standing in relief in virtue of its limestones being harder than the adjoining shales.

CRITICISMS

In comment on this article it may be said that the author shows abundant familiarity with the field described and a trained competence in analytical discussion; but the pages on structure and development are, as above noted, too geological for a properly modernized geographical essay. They show, moreover, various indications of what may be called an "imperial provincialism"; that is, a tacit and probably unconscious assumption, often characteristic of untraveled geographers, to the effect that all the world must of course be acquainted with the general geology and geography of so important a region as their home area. Thus it is here assumed that every one must surely know that the Buntsandstein underlies the

Muschelkalk. The essay is thereby made less useful to the world at large than it would have been if the manner of treating local matters had been given what may be called "international consideration."

NEED OF ILLUSTRATIVE DIAGRAMS

The description of areal subdivisions wisely avoids the introduction of village names as guides to the location of physical features; but, in using certain larger features as a means of locating various smaller ones, the text becomes fatiguing not to say obscure to readers who are not already familiar with the Eichsfeld, the Goldene Aue, the Windleite, and the Finne. Here the complete absence of graphic aids is lamentable. It may indeed be seriously questioned whether an essay in which the location of detailed features is thus treated in terms of little known larger features can be regarded as satisfactory from the reader's point of view. Several illustrative diagrams for special areas should be included, and at least one simplified outline map for the whole district, about such as the author could draw on a blackboard from memory, with the leading areal subdivisions and physiographic features indicated in as much detail as most readers will care to remember. By using such an outline and its subdivisions as guides all necessary physiographic items could be concisely located by the author and easily apprehended by the reader. The little extra labor expended in drawing such a map would be abundantly repaid by the gratitude of many a distant geographer; and it is good scientific economy for an author to undergo the labor, once for all, of thus making his pages easily intelligible so that many readers shall be spared the fatigue of trying to make out, each for himself, the meaning of obscure descriptions. Indeed, unless the author thus aids his readers their number may be smaller than he would like.

Even the greater labor of designing and drawing a diagram in explanation of so peculiar a ridge as the Klien would be warranted; for the conception and construction of such a diagram demand close attention to the facts and their meaning on the part of the author, and its interpretation yields a clear understanding to the reader. The diagram above presented, modified from an original drawn on the ground ten years ago by the late Professor Grund of Vienna, Berlin, and Prague is reproduced to illustrate the point. In this case the diagram is the more worth while because it shows that each side slope of the residual Klien is one of those physiographic rarities known as an obsequent fault-line scarp. If the author demur, saying "I can't draw," the Teutonic maxim may be administered: "You *can* draw, because you *must*." It was indeed under such disciplinary compulsion that Grund, who had not been in the habit of making similar attempts, designed his diagram during a field excursion. A year later he wrote from Prague: "I now use block diagrams frequently in my lectures and with much success."

The Vienna Basin

The essay on the Vienna basin, by Hugo Hassinger,[2] gives an elaborate account of part of a depression which lies between two extensions of the Alps, diverging northeastward on either side of Vienna. Its presentation lays a much stronger emphasis on the conditions and processes of the invisible geological past than on the conditions and forms of the visible geographical present. The treatment is advanced and detailed, the chief results of earlier studies being assumed as known in the intricate discussion to which the greater number of pages are devoted. The erudition of the author is unquestionable, but the geographical quality of his essay is for the most part obscure. Few distant geographers who begin the essay will persevere to its end.

PHYSICAL FEATURES

Fortunately an illuminating account of the leading physical features of the district is given in the introductory pages; and from these, supplemented by reference to a good map, it may be learned that the Vienna basin, the southern part of a larger intermont depression, is a triangular area heavily aggraded and now having for the most part a plain surface. It is bounded on the west by a well-dissected fault scarp, trending north-northeast, 75 kilometers in length, by which the Alpine highlands are abruptly cut off, and is limited for 95 kilometers on the southeast by the lower Leitha range, which extends northeast toward the Carpathians. The basin is separated from the rest of the intermont depression on the north, known as the Marchfeld, by the Danube, which, entering from a narrow valley in the western highlands and departing by a short passage through the southeastern range, crosses the depression in a curved course, convex to the south, 55 kilometers in length. It may be noted that the situation of Vienna at the northwestern angle of the triangle, as well as the dimensional elements here introduced, are omitted from the essay as if they were of course known to every one; an omission which affords another illustration of "imperial provincialism." Perhaps, if the author were told that he ought to have specified the situation of Vienna in its basin for the benefit of his readers, he would have felt like Bret Harte's California miner, who exclaimed: "Didn't know Flynn, Flynn of Virginia! . . . Look'ee here, stranger, whar hev you been?" Yet it is probable that few of the world's geographers really know in just which corner of the triangular basin Vienna is situated.

Three unlike areas are distinguished. The southern angle of the basin is occupied by dry and gently sloping piedmont fans, composed of pervious gravels: here several streams follow narrowly incised trenches about 20 meters deep, leaving undissected interstream spaces covered by heaths, fir plantations, and fields devoted to precarious agriculture. A middle area is covered with detrital deposits of much less thickness. Here the larger streams from the western highlands and several smaller ones fed by springs in the gravels flow in a bifurcating network through broad meadows of moist and fertile soil, in which fine-textured deposits underlying the inwashed gravels are disclosed and in which artificial drainage ditches are required. Residual patches of the gravel cover survive in low spurs and tables, 3 or 4 meters above the meadows, occupied by grain fields. In spite of its flatness, the old manorial estates of this district present a picturesque appearance. In the north the plain is benched by the terraces of the Danube; here the gravels of the southern angle of the basin are replaced by finer deposits of a considerable thickness as a result of the basin streams having been held back by ancient floods in the main river. The later entrenchment of the terracing Danube and the incision of many side valleys and ravines by the tributary streams give this area a hilly surface with a relief of from 50 to 150 meters. The chief stream of the basin, the Leitha, is pushed by the detrital fans from the higher western highlands close to the lower range on the southeast, and is peculiar in making its way through that range by an independent passage, 5 kilometers south of the Danube.

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[2] Beiträge zur Physiogeographie des inneralpinen Wiener Beckens und seiner Umrandung, *Festband*, pp. 160–197.

Criticisms: Use of Geological Terms and Explanations

The preceding paragraphs are chiefly abstracted from the first ten pages of Hassinger's essay, where many other details are to be found. The remainder of the essay is impenetrable without closer study than most geographers will care to give it. It is devoted chiefly to an elaborately analytical "history of the base level and the development of land forms in the Danube basin," in which the reader's attention is almost constantly distracted from the present and turned into the past. It abounds in the names of local geological formations, such as the Rohrbach conglomerate and the Laaerberg gravels, which can be properly understood only after a preparatory study of many special articles cited in the even hundred of supplementary references. The localities where deposition, deformation, or denudation has taken place and where various land forms occur, either within or without the Vienna basin, are inconveniently indicated by place names, of which as many as twenty may be counted on a single page. Some of the names are familiar, like Neusiedler Lake and the Iron Gate; but most of them are unfamiliar.

Nevertheless the analytical discussion here presented appears to have been conducted with competence and skill. New conclusions are announced at its close regarding the physiographic evolution of the Vienna basin as determined by various crustal warpings, for the discovery of which the author certainly deserves credit; but the discoveries are so involved with geological complications that little if any geographical significance can be attached to them as they are now stated. Moreover, the essay illustrates to perfection that exaggeration of pseudo-explanatory physiographic treatment which makes the origin of a thing more difficult to understand than the thing itself. Indeed, if such an essay as this is to be regarded as geographical, then those are justified who claim that geography is only geology masquerading under another name.

A lesson may be here learned from the practice of astronomers, who in concisely announcing the elements of a comet's orbit do not include the elaborate mathematical calculations by which the elements were determined; or from the chemists, who in briefly stating the composition of a substance submitted for analysis say nothing of all the manipulations by which the composition was learned. Let morphogenetic geographers be as geologically analytical as they like and let them publish their geological analyses in appropriate journals if they wish; but, when it comes to presenting their geographical results, let their statement be directed to the manifestly geographical object of giving a helpful account of visible landscapes.

The Podolian Upland in Galicia

Lemberg, the capital of Galicia as things used to be, lies near the mid-European divide between the head branches of the Vistula flowing northwest to the Baltic and of the Dniester flowing southeast to the Black Sea. The Podolian upland, the longest of the Ukraine interfluves, extends far southeastward from near Lemberg, between the Dniester and its nearly parallel neighbor, the Bug. The Galician part of the upland and some associated areas on the northwest are described by Stefan Rudnyćkyj[3] on the basis of field work carried on through ten years preceding the war. Several subdivisions of the region are treated separately. Their form is first described, for the most part empirically but occasionally in explanatory style; then their structure is presented in geological terms; some morphogenetic paragraphs are added. Attention is given in this review to the Galician part of the Podolian upland proper, which measures about 140 kilometers in width between its limiting rivers and which includes 180 kilometers of its total length of 500 or 600 kilometers.

PHYSICAL FEATURES

From the lower land around Lemberg, about 200 meters above sea level, a rapid ascent is made by a ragged, northwest-facing escarpment to the head of the upland interfluve, there about 400 meters in altitude. Thence the upland slopes very gradually to the southeast. The escarpment is not regarded as a cuesta face, for it is not determined by a resistant capping formation. Some of the former tributaries of the Dniester north-

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[3] Die podolische Platte in Galizien, *Festband*, pp. 198–211.

west of the Podolian upland have been completely diverted to the Vistula; others, which head in notches in the upland scarp, have lost an undetermined measure of their former length. Hence the scarp may perhaps be the result of encroachment by lower-lying Vistula tributaries upon the upland area drained by higher-lying Dniester tributaries. The upland is composed for the most part of horizontal strata which exhibit, apparently as the result of advanced erosion in a former cycle before the uplift which prompted the river captures above noted, a gently undulating surface of low swells and shallow troughs with northwest-southeast trends about parallel to the main rivers by which the interfluve is bounded. Curiously enough it is drained for the most part by subparallel, south-flowing Dniester tributaries which cross the swells obliquely and cut them into short segments. No adequate explanation of these features is presented. Some of the segments are crowned by ruin-like remnants of reef limestones; each segment is usually higher in the northwest than to the southeast, partly as the result of unsymmetrical loess deposits. The shallow troughs lead longer branch streams from the northwest and shorter backhanded branches from the southeast, to the south-flowing rivers. Eleven of these rivers, from 40 to 130 kilometers in length, may be counted in Galician Podolia, and as many more farther southeast in Ukrainian Podolia. The members of the first group, of which the Sereth is a good example, wander in their upper courses on broad valley floors, which seem to date from the same cycle of erosion as that to which the swells and troughs owe their subdued expression. Farther down stream their courses are incised beneath the valley floors; there the streams flow in narrow meandering valleys which attain a depth of from 100 to 180 meters, with sharp-cut sides showing two terraces. The uplands are largely occupied with grainfields; villages with green gardens lie in the valleys even where they are deeply incised.

The pronounced entrenchment of the south-flowing rivers is a sequence to the even deeper entrenchment of the Dniester, which, long ago pushed away from the Carpathians by the detrital outwash of vigorous, square-branching tributaries from the southwest, now flows in a wonderfully meandering canyon, incised 200 meters or more beneath its former valley floor. The equal of this meandering canyon is hardly to be found in Europe. The river is still deepening its course and has few and narrow flood-plain scrolls; the steep walls of the valley are maintained by a hard red sandstone. The incised valleys of the larger tributaries steepen their fall as they approach the master river; the valleys of the smaller branches hang over the main canyon bottom.

Criticisms: Need of Location Maps

The above extracts suffice to show that Rudnyćkyj's article contains much matter of interest about a region little known physiographically;

but the article does not reveal a well-developed method of geographical presentation. Its descriptions are difficult to follow because, in the absence of a guide map, the names of villages and streams are used in locating boundaries and physical features. Not one geographer in a hundred—or a thousand—can use these local names to place the six areal subdivisions of the region, Roztoče, Ponyźe, Pidopil'e, Opil'e, Podnistrje, and Podil'e or Podolia proper. It is nothing less than self-deception for an author to think that his readers can follow the eastern boundary of Ponyźe, for example, when he tells them that it passes by Rudno, Hlynna, Pustomyty, Mylošovyči, Chorosno, Krasiv, Brodky, Demnia, and Mykolajiv. Even if the attempt is made to look up the place names thus used, few of them can be found on easily accessible maps, such as those in Stieler's atlas; indeed, it is difficult to find all of them, partly because of differences in spelling, among the countless other names that are given on the Austrian map of central Europe, 1:200,000, or on the larger-scale topographical sheets of Austria-Hungary, 1:75,000.

It cannot be believed that such use of these generally unknown place names to locate unknown physiographic features represents the best method of geographical description. It shows too little inventiveness because, in the absence of an outline map in the text, some plan for the verbal description of areas should have been devised in terms of contiguous triangles, semicircles, scrolls, and other readily conceivable patterns, within each of which various details might then be placed with as much accuracy as is conveniently attainable by words alone. It shows too much provincial introspection because, in the use of place names that are familiar to the author but unknown to practically all readers of his article, he fails to realize the small share of space and of attention that Galician Podolia occupies in the busy world. A much better method involves the use of an outline map as a graphic aid. In truth, when an author uses unknown place names as guides to the location of unknown physiographic features, it is tantamount to saying: "It is too much trouble for me to represent these features on an outline map or to define them verbally in terms of easily conceivable patterns; if you readers want to know where the features are, look up the guiding names on a map."

LACK OF ATTENTION TO GEOGRAPHIC PRESENTATION

That less attention has been paid in the preparation of this article to the art of geographic presentation than to the science of geographic investigation is manifest in various ways. The introduction of underground structure after the surface forms have been described is a curious inversion of a more reasonable procedure: for, if explanatorv methods are to be employed at all, underground structures should be used as an aid in understanding the form of the surface, and hence structure should come before form. The frequent omission of details concerning the attitude, composition, thickness, and resistance of stratified formations is not compensated by the mention of their geological names; indeed, it by no means follows that such names, which have been invented by geologists for their own purposes, are the best names for the purposes of geographers. Certain passages in the text make it clear that the unlike requirements of geological and geographical presentation have not been mastered; it truly gives a learned appearance to a page to say that the marine Devonian beds which occur in southeastern Galicia have heretofore been erroneously ascribed to the Silurian, that certain strata in the upland represent the transition from the Mediterranean to the Sarmatian period, and that of the two terraces in the valleys one is young diluvial and the other old alluvial; but if the space thus occupied had been devoted to explanatory descriptions of more visible things—for example, to the reason for the oblique course of the south-flowing rivers with respect to the upland system of swells and troughs, and to specific accounts of the terraces as elements of the valley landscape—geography would have been the gainer.

Let the field work on which these geological statements are based be continued by all means; let the history of the changes that took place in Podolia during the Glacial period be worked out as far as possible, if the author's interest turns especially in that direction; but, if the author be a geographer, let all these studies and many more be pursued with a truly geographical object. Then, after the necessary field investigations are well advanced, let the geographical account of the region be freed from all irrelevant erudition so that single-minded attention shall be given to the facts of today; let these facts be presented according to some well-tested scheme, either empirical or explanatory; and let the presentation be easily intelligible, especially to readers who do not know the region, for in that class belong most of the geographers of the world. Instead of presenting the geographically useless information that the "Turon-, Emscher-, and Senonkreide" occur in Podnistje, or that certain Miocene beds in Podolia are covered with "sarmatischen Ervilien- und Serpulenkalken," the remarkable contrast in meander pattern presented by the Dniester before and after it enters the upland might have been described: in its upper course it winds freely on a broad flood plain in small, close-packed meanders, 1/5 to 1/3 kilometer in radius, the meander belt itself winding in somewhat larger curves; while in its lower canyon-like course, the meanders are much larger, being 1 or 2 kilometers in radius, and the river there vigorously swings around the spurs and undercuts the great amphitheaters, alternately right and left, in thoroughly competent fashion.

A QUESTIONABLE STATEMENT AS TO EROSION

With increased attention to these physiographic matters, correction might be made of a questionable statement in a final paragraph to the effect that, while downward erosion is still operative in the winding Dniester canyon, lateral erosion is as yet imperfectly developed; for unless this river is unlike many others of similar appearance—for example, the Seine and the Mosel—its lateral erosion, outward on each meander and down-valley on each tangent, has already exceeded its vertical erosion. Unintentional testimony for the outward expansion of the meanders by lateral erosion is given in the mention of the two terraces on the slope of the meander spurs; but nothing is said of the expectable contrast between the steeper slopes of the undercut, up-valley sides of the spurs and the gentler slopes of the slip-off, down-valley sides, although this contrast is strong enough in certain other incised meandering valleys to determine that the steep slopes shall be left to tree growth, while the gentler slopes are cleared and cultivated.

It may perhaps be objected that the foregoing pages overemphasize the importance of presentation as compared with investigation. In reply it is recognized that while original research is of course the prime essential of scientific progress, and while the scientist who conducts the research profits by its successful prosecution, the world at large will know nothing of it until it is communicated and even then will not know the truth about it unless it is communicated properly. The first requirement of investigation is that its results shall be correct and accurate; similarly, the first requirement of presentation is that its statements shall be clear and intelligible. The former promotes the increase of knowledge; the latter promotes the diffusion of knowledge. Each process should be developed to best advantage. The essays above reviewed give abundant indication that their authors were careful and competent in the conduct of their investigations. Not so much can be said as to their skill in the presentation of the results of their investigations.